

No.



9000226

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

**Pioneer Hi-Bred International, Inc.**

Whereas, THERE HAS BEEN PRESENTED TO THE

**Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (T. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SORGHUM

'PH256'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this *29th* day of *April* in the year of our Lord one thousand nine hundred and ninety-four.

Attest:

*Kenneth Hoans*  
Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

*Mike Esny*  
Secretary of Agriculture



U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

## APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S) Pioneer Hi-Bred International, Inc.		2. TEMPORARY DESIGNATION		3. VARIETY NAME PH256	
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) 700 Capital Square 400 Locust Street Des Moines, Iowa 50309		5. PHONE (Include area code) (515) 253-2121		FOR OFFICIAL USE ONLY VPPO NUMBER 9000226	
6. GENUS AND SPECIES NAME Sorghum Bicolor		7. FAMILY NAME (Botanical) Graminae		FILING DATE <u>July 20, 1990</u> TIME <input checked="" type="checkbox"/> A.M. <input type="checkbox"/> P.M.	
8. KIND NAME Sorghum		9. DATE OF DETERMINATION Jan. 1989		AMOUNT FOR FILING \$ <u>2150</u> DATE <u>July 20, 1990</u>	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) Corporation				AMOUNT FOR CERTIFICATE \$ <u>250.00</u> DATE <u>March 25, 1994</u>	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION Iowa				12. DATE OF INCORPORATION May 27, 1926	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Mary Helen Mitchell Pioneer Hi-Bred International, Inc. 700 Capital Square, 400 Locust Street Des Moines, Iowa 50309 PHONE (Include area code): (515) 245-3500					
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED					
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)					
b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement.					
c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety (Request form from Plant Variety Protection Office.)					
d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety.					
e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership.					
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.) <input type="checkbox"/> Yes (If "Yes," answer items 16 and 17 below) <input checked="" type="checkbox"/> No					
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input type="checkbox"/> Foundation <input type="checkbox"/> Registered <input type="checkbox"/> Certified		
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <input type="checkbox"/> Yes (If "Yes," give date) <input checked="" type="checkbox"/> No					
19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES? <input type="checkbox"/> Yes (If "Yes," give names of countries and dates) <input checked="" type="checkbox"/> No					
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF APPLICANT <u>Mary Helen Mitchell</u>				DATE <u>7-9-90</u>	
SIGNATURE OF APPLICANT				DATE	

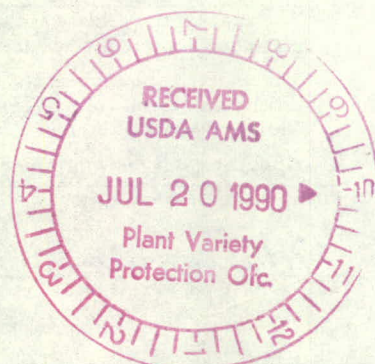


## INSTRUCTIONS

**General:** Send an original copy of the application and exhibits, at least 2,500 viable seeds (*furnish only untreated seed*), and \$1,800 fee (\$200 filing fee and \$1,600 examination fee) to the U. S. Department of Agriculture, Agricultural Marketing Service, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. (See Section 180.175 of the Regulations and Rules of Practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

### Item

- 9 Give the date the applicant determined that he had a new variety based on (1) the definition in Section 41(a) of the Act and (2) the date a decision was made to increase the seed.
- 14a Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.
- 14b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties: (1) identify these varieties and state all differences objectively; (2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.
- 14c Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.
- 14d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 14e Section 52(4) of the Plant Variety Protection Act requires applicants to furnish a statement of the basis of the applicant's ownership. The applicant may be the actual breeder, the employer of the breeder, the owner through purchase or inheritance, etc.
- 15 If "Yes" is specified (*seed of this variety be sold by variety name only as a class of certified seed*) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified "No," he may change his choice. (See Section 180.16 of the Regulations and Rules of Practice.)
- 19 See Sections 41 (i,j) and 42 of the Plant Variety Protection Act and Section 180.7 of the Regulations and Rules of Practice for eligibility requirements.
- NOTE: All information submitted in support of an application becomes PUBLIC INFORMATION once the certificate is issued. (See Section 180.17 of the Regulations and Rules of Practice.)





SORGHUM  
'PH256'

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14A. Exhibit A. Origin and Breeding History

PEDIGREE: TX2736/PH164-K)XE611X

Pioneer proprietary line 'PH256', Sorghum bicolor M., a grain sorghum inbred, was developed by Pioneer Hi-Bred International, Inc., from the  $F_2$  population of the single cross TX2736 X PH164. TX2736 is an inbred released from Texas A & M University that is resistant to biotype C greenbugs and PH164 is a proprietary line of Pioneer Hi-Bred International, Inc., that has excellent dryland stress tolerance. The pedigree method of breeding was used in the development of this inbred as per the following:

The  $F_1$  cross was made in Jamaica, W.I., the winter of 1977-1978 and  $F_2$  seed was also obtained during the winter of 1977-1978. The  $F_2$  population was grown at Plainview, Texas, in 1978 and selected plants were self pollinated. Fifty-six heads were saved from the  $F_2$ . The  $F_3$ 's were grown head to row in the winter of 1978-1979 in Jamaica, W.I., and two heads were selfed on selected rows. The  $F_4$  family was grown during the summer of 1979 at Plainview, Texas, where two heads were selfed.  $F_5$  selections were grown during the winter of 1979-1980 in Jamaica, W.I., where two heads were selfed. In addition, the line was test crossed to an inbred female tester line for evaluation of combining ability. In 1980, the  $F_6$  generation was grown and the line was bulked to best row of two during the summer at Plainview, Texas. Yield trials were also grown at Plainview, Texas, involving test crosses made at  $F_5$ . Based on yield test results and nursery observations, the line was determined to restore A1 cytoplasm and possess some superior qualities for greenbug tolerance and performance under dryland stress and it was advanced in the test program. The line was bulked at  $F_6$  and no further selection within the line was practiced. Additional hybrid combinations were observed in 1982-1989 at Plainview, Texas, and at other Pioneer Research Stations during 1983-1989. The line was confirmed to be true breeding and named 'PH256' in 1982. An outline of the breeding profile of the inbred is attached.

'PH256' has shown stability for traits listed in Exhibit C. It has been self pollinated, bulk increased and checked for uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased by hand pollination and in isolated field plantings with continued observation for uniformity.

This inbred will have a tall variant that occurs, due to mutation, at a frequency of 1 in 10,000, on the average. This is due to a gene that is unstable for height at the  $DW_3$  locus.

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the selection and development of 'PH256'. Pioneer Hi-Bred International, Inc., has the sole rights and ownership of 'PH256'.



## 14A. Exhibit A. Origin and Breeding History of 'PH256'

Sorghum inbred line

<u>Season/ Year</u>	<u>Inbreeding Level</u>	<u>Nursery Location</u>	<u>Pedigree</u>	<u>Number Of Heads Saved</u>
W/1977-78	F <sub>0</sub>	Jamaica, W.I.	F <sub>1</sub> Cross Made	1
W/1977-78	F <sub>1</sub>	Jamaica, W.I.	TX2736/PH164-K)	Bulk
S/1978	F <sub>2</sub>	Plainview, TX	TX2736/PH164-K)X	56
W/1978-79	F <sub>3</sub>	Jamaica, W.I.	TX2736/PH164-K)XE6	2
S/1979	F <sub>4</sub>	Plainview, TX	TX2736/PH164-K)XE61	2
W/1979-80	F <sub>5</sub> *	Jamaica, W.I.	TX2736/PH164-K)XE611	2
S/1980	F <sub>6</sub>	Plainview, TX	TX2736/PH164-K)XE611X	Bulk
S/1981	F <sub>7</sub> **	Plainview, TX	TX2736/PH164-K)XE611X	Bulk

January 1989 - Line named 'PH256'

1982-1987 - Line increased by hand pollination and in isolated fields  
for use in hybrid seed production

\* Test crosses made for yield testing

\*\* Line tested in several parental combinations to select hybrids  
acceptable for sales.



## Amended Exhibit B. Novelty Statement - 'PH256'

'PH256' is most similar to TX2737. Compared to TX2737, 'PH256' yields 30% less, has 17% less stalk lodging, 20% less root lodging and 55% less post freeze lodging. 'PH256' shows less than 25% infection from downy mildew as compared with TX2737 which has from 30-50% infection. 'PH256' is similar to TX2737 in harvest moisture, test weight, head type, gray leaf spot tolerance and head fusarium susceptibility. Both inbreds have similar ratings for head smut, leaf rust and anthracnose resistance and both are resistant to biotype C greenbugs. 'PH256' is white seeded with similar kernel characteristics to TX2737. 'PH256' is 3 days earlier to flower than TX2737.

Downy mildew	-	<u>Peronosclerospora sorghi</u>
Anthracnose	-	<u>Colletotrichum graminicola</u>
Gray leaf spot	-	<u>Cercospora sorghi</u>
Head smut	-	<u>Sphacelotheca reiliana</u>
Leaf rust	-	<u>Puccinia purpurea</u>
Head fusarium	-	<u>Fusarium spp.</u>



14D. Amended Exhibit D. Comparison of 'PH256' and TX2737. Values are expressed as actual values (yield, plant height, days to flower), as percentages (% lodged) and as percent of mean. Disease ratings are actual scores (rated 1-9 with 9 best) based on relative disease damage in special disease nurseries as described at the bottom of the table.

Gray Leaf Spot & Leaf Rust	9 = Few lesions (less than 10% tissue damage)- healthy plant
	5 = Moderate number of lesions - slight necrosis - little or no affect on yield
	1 = Numerous lesions - extensive necrosis leaf and plant death
Head Smut Score	9 = 0-1% infected plants
	5 = 10-12% infected plants
	1 = 20% or more infected plants
Downy Mildew Score	9 = 0-1% infected plants
	5 = 15-20% infected plants
	1 = 30-50% or more infected plants
Head Fusarium Score	9 = 0-1% infected plants
	5 = 20-25% infected plants
	1 = 50% or more infected plants



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PLANT VARIETY PROTECTION OFFICEEXHIBIT C  
OBJECTIVE DESCRIPTION FORM FOR SORGHUM  
AND RELATED CROPSVARIETY NAME: PH256PLANTING: LOCATION: Plainview LATITUDE: \_\_\_\_\_ DATE: May 19, 1990OBSERVATIONS SHOULD BE MADE ON AN APPROPRIATE NUMBER OF WELL SPACED PLANTS  
(APPROXIMATELY 15 CM SPACING).

## 1. GENERAL CATEGORIES:

- ☐ 1 KIND: 1=SORGHUM 2=SORGHUM ALBUM 3=SUDANGRASS  
4=JOHNSONGRASS 5=OTHER
- ☐ 3 INBRED TYPE: 1=MALE STERILE 2=MAINTAINER 3=RESTORER
- ☐ 1 MALE STERILE CYTOPLASM: 1=A-1 2=A-2 3=A-3 4=A-4 5=A-5  
6=OTHER
- ☐ 1 USE CLASS: 1=GRAIN 2=FORAGE 3=SILAGE 4=SUGAR 5=SYRUP  
6=BROOMCORN 7=MULTIPURPOSE (SPECIFY) \_\_\_\_\_

## 2. MATURITY:

- ☐ 7 3 DAYS FROM PLANTING TO MID-ANTHESIS
- ☐ 5 NO. DAYS EARLIER THAN: ☐ 4 1=TX3042 2=WHEATLAND 3=TX2737 4=TX430
- ☐ 5 NO. DAYS LATER THAN: ☐ 1 5=REDLAN 6=OTHER (SPECIFY) \_\_\_\_\_

## 3. PLANT:

- ☐ COLEOPTILE: 1=GREEN 2=RED
- ☐ 3 PLANT PIGMENT: 1=TAN 2=RED 3=PURPLE

## 4. STALK:

- ☐ 2 DIAMETER (MAIN STALK): 1=SLIM 2=MID-STOUT 3=STOUT
- HEIGHT:
- ☐ 9 3 CM FROM SOIL LEVEL TO TOP OF PANICLE
- ☐ 2 7 CM LESS THAN ☐ 5 1=TX3042 2=WHEATLAND 3=TX2737 4=TX430
- ☐ CM GREATER THAN ☐ 5 5=REDLAN 6=OTHER (SPECIFY) \_\_\_\_\_
- ☐ 3 NO. OF RECESSIVE HEIGHT GENES
- PLANT HEIGHT GENOTYPE (MARK ONLY RECESSIVE): ☐ dw1 ☐ dw2 ☐ dw3 ☐ dw4
- ☐ 1 WAXY BLOOM: 1=PRESENT 2=ABSENT
- ☐ 2 TILLERS: 1=FEW 2=MODERATE 3=MANY
- ☐ 2 SWEETNESS: 1=SWEET 2=INSIPID
- ☐ 1 JUICINESS: 1=DRY (PITHY) 2=JUICY
- ☐ 2 PANICLE EXsertION: 1=SHORT 2=MEDIUM 3=LONG

## 5. LEAF: (FIRST LEAF BELOW FLAG LEAF)

- ☐ 2 WIDTH (RELATIVE TO CLASS): 1=NARROW 2=MODERATE 3=WIDE
- ☐ 2 COLOR: 1=LIGHT GREEN 2=DARK GREEN
- ☐ 2 MARGIN: 1=SMOOTH 2=WAVY
- ☐ 3 ATTITUDE: 1=ERECT 2=HORIZONTAL 3=DROOPING
- ☐ 1 LIGULE: 1=PRESENT 2=ABSENT
- ☐ 3 MIDRIB COLOR: 1=WHITE 2=INTERMEDIATE 3=CLOUDY 4=YELLOW 5=BROWN

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9. DISEASE RESISTANCE: (1=SUSCEPTIBLE 2=INTERMEDIATE 3=RESISTANT)  
 BACTERIAL STRIPE, CHARCOAL ROT, MAIZE DWARF MOSAIC VIRUS,  
 PUCCINIA (RUST), BACTERIAL STREAK, BACTERIAL SPOT, ANTHRACNOSE,  
 HEAD SMUT, SOOTY STRIPE, DOWNY MILDEW, GRAIN MOLD, FUSARIUM STALK ROT  
 OR OTHERS.

REACTION	DISEASE	CAUSAL AGENT	RACE OR PATHOTYPE
1	Anthracnose		
2	Head Smut		Race 4
2	Head Smut		Race 5
2	Downy Mildew		Pathotype 1
1	Downy Mildew		Pathotype 3
2	Gray Leaf Spot		
2	Head Fusarium		
2	Fusarium Head Blight		
2	Rust		
3	Charcoal Rot		

10. INSECT RESISTANCE: (1=SUSCEPTIBLE 2=INTERMEDIATE 3=RESISTANT)  
 SORGHUM MIDGE, CHINCH BUG, GREENBUG OR OTHERS

REACTION	INSECT	BIOTYPE
3	Greenbug	C
1	Greenbug	E

11. OTHER DISTINGUISHING TRAITS:

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## 14D. Exhibit D. Additional Description of 'PH256'

'PH256' is a grain sorghum, Sorghum bicolor M., inbred.

As an inbred per se, 'PH256', is similar to TX2737 in a number of plant characteristics. Both inbreds have dark green leaves, purple plant pigment, pithy insipid stalks, similar leaf length and width, yellow anthers, no subcoat in testa and corneous endosperm. However, there are some distinguishable differences between 'PH256' and TX2737 as stated in Exhibit B. In addition to those differences, 'PH256' has drooping leaves with a waxy margin and TX2737 has horizontal leaves with a smooth margin.

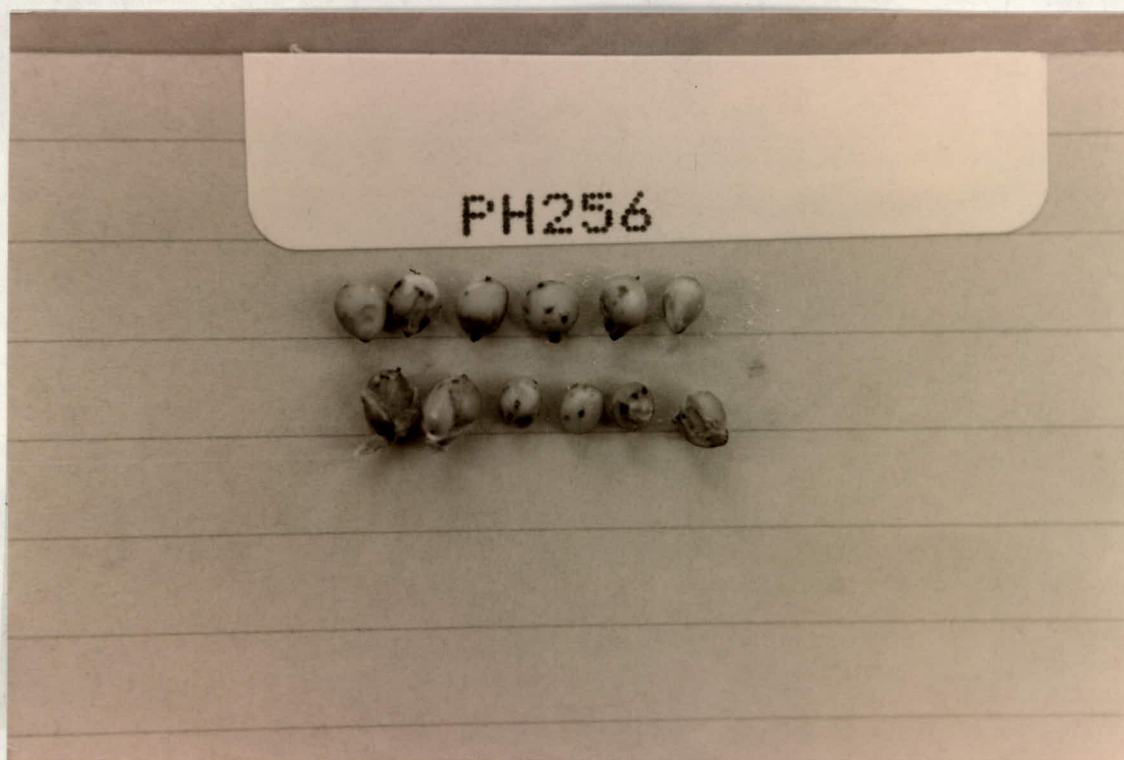
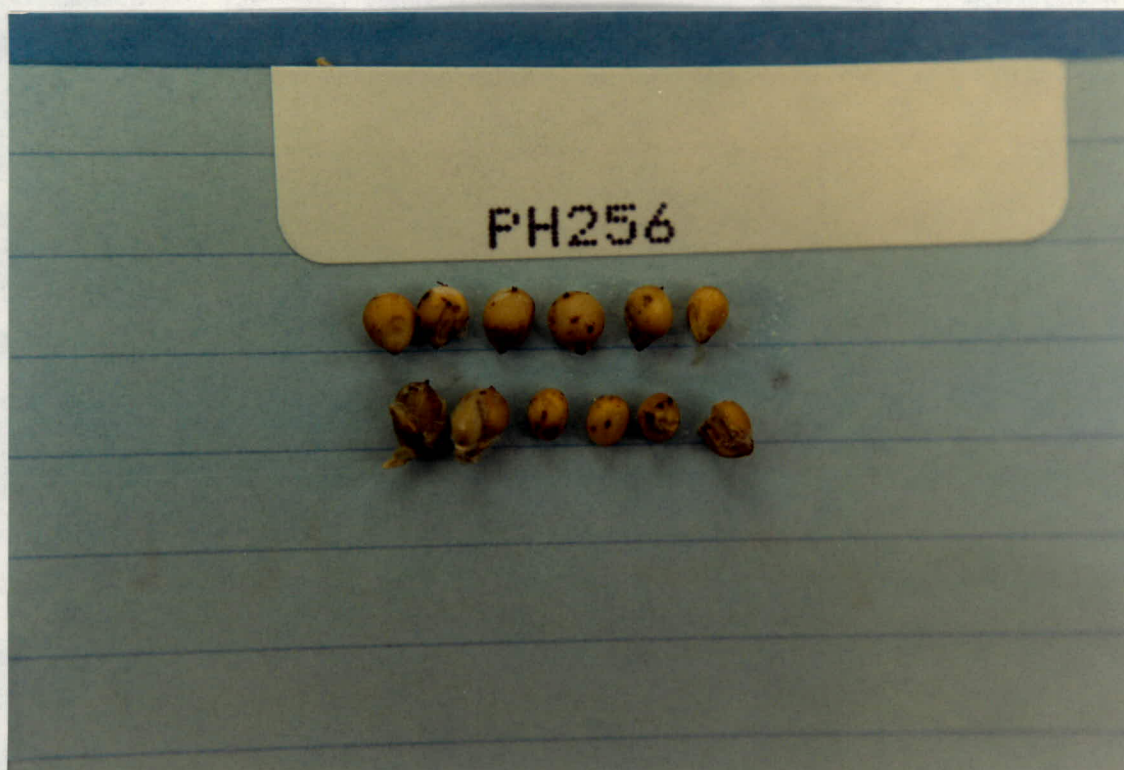
Hybrids involving 'PH256' are characterized as being earlier in maturity and more resistant to stalk, root and post freeze lodging damage.



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14D. Exhibit D. Additional Description of 'PH256'

c. Seed





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14D. Exhibit D. Additional Description of 'PH256'

a. Whole plant

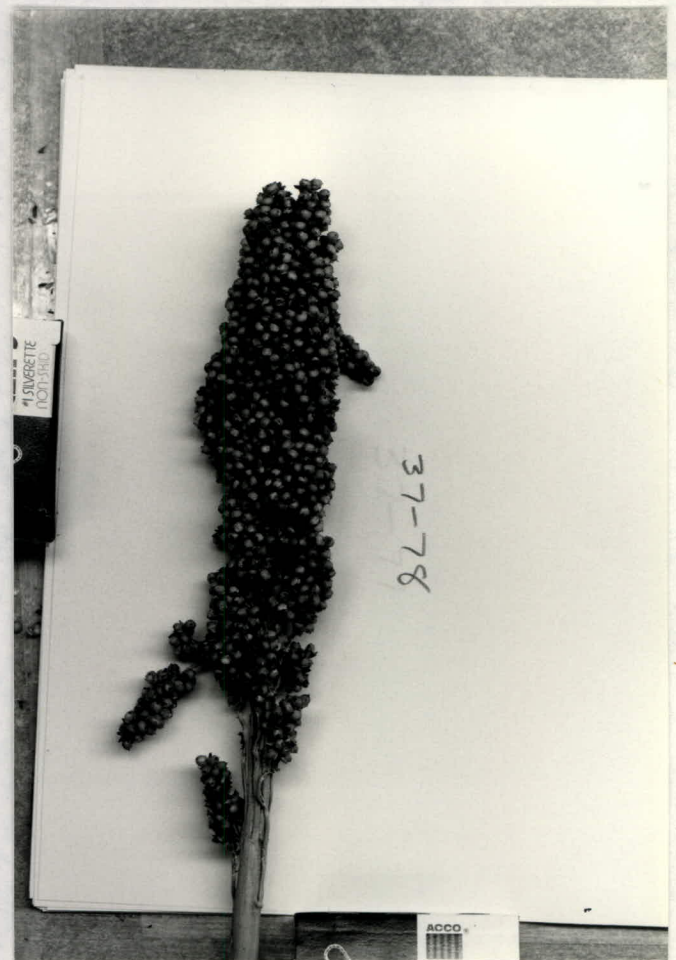




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14D. Exhibit D. Additional Description of 'PH256'

b. Head





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14E. Exhibit E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the selection and development of 'PH256'. Pioneer Hi-Bred International, Inc., has the sole rights and ownership of 'PH256'.